REMARKS

Applicants' representative thanks the Examiner for the courtesies extended during the telephonic conference on March 11, 2008, with Francis Dunn. During the conference, there was discussion regarding the rejection of the subject claims under 35 U.S.C. § 101, 35 U.S.C. § 112, and 35 U.S.C. § 102. There also was discussion regarding "training algorithm" as well as discussion regarding "cost".

Claims 1, 3-25, 27-30, 32-42, 44-48, 50-60 and 62-64 are currently pending in the subject application and are presently under consideration. Claims 1, 3-25, 27-30, 32-42, 44-48, 51-57, 59, and 62-64 have been amended as shown on pages 2-25 of the Reply. No new matter has been added.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1, 3-25, 27-30, 32-42, 44-48, 50-60 and 62-64 Under 35 U.S.C. § 101

Claims 1, 3-25, 27-30, 32-42, 44-48, 50-60, and 62-64 stand rejected under 35 U.S.C. § 101 on the grounds that the claimed invention is directed to non-statutory subject matter. Withdrawal of this rejection is requested for at least the following reasons. Claims 1, 3-25, 27-30, 32-42, 44-48, 50-60, and 62-64 produce a useful, concrete and tangible result and are directed to statutory subject matter in accordance with 35 U.S.C. § 101.

> Because the claimed process applies the Boolean principle [abstract idea] ***to produce a useful, concrete, tangible result*** … on its face the claimed process comfortably falls within the scope of §101. *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352, 1358. (Fed. Cir. 1999) (Emphasis added); *See State Street Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373, 47 USPQ2d 1596, 1601 (Fed.Cir.1998). The inquiry into patentability requires an examination of the contested claims to see if the claimed subject matter, as a whole, is a disembodied mathematical concept representing nothing more than a "law of nature" or an "abstract idea," or if the mathematical concept has been ***reduced to some practical application rendering it "useful."*** *AT&T* at 1357 *citing In re Alappat*, 33 F.3d 1526, 31 1544, 31 U.S.P.Q.2D (BNA) 1545, 1557 (Fed. Cir. 1994) (emphasis added).

The claimed subject matter relates generally to systems and methods that facilitate building a model to characterize data based on an appropriately sized subset of a computer readable data set. In particular, independent claim 1, as amended, recites: [a] ***computer implemented system that facilitates building a statistical model for a computer readable data set***, comprising: ***a first training method that efficiently builds a rough statistical model from a subset of the computer readable data set*** capable of statistical characterization; ***an evaluation component that evaluates the rough statistical model to determine whether the subset of the computer readable data set is an appropriate subset to be utilized to build a refined statistical model for the computer readable data set based at least in part on stopping criterion to facilitate reducing cost of clustering data relative to the computer readable data set***; ***a second training method that builds the refined statistical model for the computer readable data set*** from the subset if the subset is deemed appropriate by the evaluation component, ***the refined statistical model provides a more accurate modeling of the subset than the rough statistical model and facilitates determining good clustering of data for a fixed number of clusters based at least in part on predefined accuracy criteria to facilitate clustering of data relative to the computer readable data set, wherein the clustered data is provided***; and a data scheduler that, based at least in part on a data policy, adaptively controls the size of subsets for which the first training method is applied to facilitate building the refined statistical model.

The claimed subject matter recites features and/or functionality that can facilitate constructing a refined statistical model from statistically characterizable data associated with a set of data (*e.g.,* computer readable data set) in a computationally economic and time-efficient manner, and utilizes the refined statistical model to facilitate determining clusters of data relative to data set based in part on predefined accuracy criteria. The clustered data can be provided as an output. Clustering a set of data is a useful, concrete and tangible result, as clustering data can be useful is gaining knowledge regarding the set of data, for instance, gaining knowledge regarding common relationships or traits among the respective pieces of data in the data set. The claimed subject matter also can

be useful with regard to data mining, including clusterization of data obtained through data mining.

In a manner similar to independent claim 1, independent claims 19, 30, 42, 44, 53, 54, and 62-64 each contain subject matter that can facilitate building statistical models to facilitate clustering data relative to a set of data (*e.g.,* computer readable data set) in a cost-efficient manner, wherein the clustered data can be provided. Independent claim 19, as amended, recites: [a] ***computer implemented system programmed to facilitate building a statistical model***, comprising: ***a first parameter estimation protocol that efficiently builds a rough statistical model*** from a subset of a computer readable data set . . . ; ***an evaluation component that determines whether the subset of data from which the rough statistical model was built is an acceptable size for building the statistical model to characterize the data set, the evaluation component utilizes a stopping criterion*** that is functionally related to an expected incremental benefit and an expected incremental cost associated with increasing the size of the subset of data to facilitate determining whether the rough statistical model is an acceptable size and ***to facilitate reducing cost of clustering data relative to the computer readable data set***; and ***a second parameter estimation protocol that builds a refined statistical model*** for the data set from the subset if determined to have the acceptable size, . . . ***the refined statistical model employed to identify clusters of data within the computer readable data set to facilitate clustering data relative to the computer readable data set, wherein the clustered data is provided***.

Independent claim 30, as amended, recites: ***[a] computer implemented learning curve method to facilitate building a statistical model***, comprising: . . . employing a first training method to build a rough statistical model to characterize the subset; ***evaluating the rough statistical model for acceptability***; if the rough statistical model is unacceptable, repeatedly increasing the size of the subset of data to provide an aggregate data set, building another rough statistical model to characterize the aggregate subset, and reevaluating the other rough statistical model, ***the acceptability of each rough statistical model based at least in part on a stopping criterion*** functionally related to an expected incremental benefit and an expected incremental cost associated with increasing the size of the aggregate subset in order ***to facilitate reducing cost associated with clustering***

data relative to the computer readable data set; and if the rough statistical model is acceptable, ***employing a second training method to build a refined statistical model*** based at least in part on the aggregate data set, the second training method being different from the first training method, ***the refined statistical model identifies data clusters contained in the computer readable data set to facilitate clustering of data relative to the computer readable data set, wherein the clustered data is provided***.

Independent claim 42, as amended, recites: ***[a] computer-readable medium having computer-executable instructions for: . . . building a rough statistical model to characterize the subset*** based at least in part on an associated training policy; ***evaluating the rough statistical model for acceptability***; if the rough statistical model is unacceptable, repeatedly increasing the size of the subset of data to provide an aggregate data set, building a rough statistical model to characterize the aggregate subset based at least in part on an associated training policy, and reevaluating the rough statistical model; ***building a refined statistical model for the computer readable data set from the aggregate data set if the rough statistical model is determined to be acceptable*** based at least in part on an associated training policy that includes ***determining acceptability based at least in part on an expected incremental benefit relative to an expected incremental cost associated with increasing the size of the aggregate data set in order to facilitate reducing cost associated with clustering data relative to the computer readable data set***, the refined statistical model more accurately characterizes the aggregate data set; and ***utilizing the refined statistical model to identify identifiable clusters in the computer readable data set to facilitate clustering data relative to the computer readable data set, wherein the clustered data is provided***.

Independent claim 44, as amended, recites: ***[a] computer implemented method to facilitate constructing a statistical model, comprising: . . . determining a data subset from the training data set by estimating statistical model parameters according to a first training policy and evaluating the estimated statistical model parameters*** relative to the holdout data set and repeating the estimation and evaluation of statistical model parameters with a larger subset of the training data set until an acceptable quality of the estimated statistical model is established ***to facilitate reducing cost associated with characterizing clusters relative to the computer readable data***; controlling parameter

initialization employed in each estimation of statistical model parameters repeatedly until an acceptable size for the determined data subset is achieved; and subsequent to establishing the acceptable quality of the estimated statistical model, ***using the determined data subset to improve the estimated statistical model parameters by employing a second training policy that is more accurate than the first training policy***, the estimated model parameters obtained from employment of ***the second training policy utilized to characterize at least one cluster within the computer readable data to facilitate clustering data relative to the computer readable data, wherein the clustered data is provided***.

Independent claim 53, as amended, recites: ***[a] computer-readable medium having computer-executable instructions for: . . . determining a data subset from the training data set by estimating model parameters and controlling model parameter initialization according to a first training policy and evaluating the estimated model parameters*** relative to the holdout data set and repeating the estimation, initialization, and evaluation of model parameters with a next successively larger subset of the training data set until an acceptable quality of the estimated model is established ***to facilitate reducing cost associated with clustering data relative to the computer readable data***; subsequent to establishing the acceptable quality of the estimated model, ***using the determined data subset to improve the estimated model parameters by employing a second training policy that is more accurate than the first training policy; and utilizing the estimated model parameters determined by utilization of the second training policy to identify a cluster in the computer readable data to facilitate clustering data relative to the computer readable data, wherein the clustered data is provided***.

Independent claim 54, as amended, recites: ***[a] computer implemented method to facilitate constructing a statistical model***, comprising: . . . ***iteratively estimating statistical model parameters for a subset of the training data set*** over a fixed number of iterations and ***evaluating the estimated statistical model parameters*** relative to the holdout data set; ***repeating the estimation and evaluation of statistical model parameters obtained with successively larger subsets of the training data set until an acceptable model quality is established, acceptable model quality determined based at least in part on an expected incremental benefit relative to an expected incremental***

detriment associated with an increase in size of each larger training subset of the data set in order to facilitate reducing cost associated with clustering data relative to the computer readable data; after the acceptable model quality is established, ***iteratively estimating statistical model parameters for the data subset, which provided the acceptable model quality, until a better quality of model is provided*** relative to a preceding estimation performed over the fixed number of iterations; and ***using the better quality model relative to the computer readable data to identify at least a cluster of data within the computer readable data to facilitate clustering data relative to the computer readable data, wherein the at least a cluster of data is provided***.

Independent claim 62, as amended, recites: ***[a] computer implemented method to facilitate constructing a statistical model, comprising: . . . iteratively estimating statistical model parameters for a subset of the training data set until a first convergence threshold is satisfied and evaluating the estimated statistical model parameters*** relative to the holdout data set; ***repeating the estimation and evaluation of statistical model parameters obtained with successively larger subsets of the training data set until determining a size of data subset that provides acceptable statistical model parameters, acceptable statistical model parameters attained where the expected marginal cost outweighs the expected marginal benefit associated with successively larger subsets in order to facilitate reducing cost associated with clustering data relative to the computer readable data***; after determining the size of data subset that provides acceptable statistical model parameters, ***iteratively estimating statistical model parameters for a data subset of the acceptable size until a second convergence threshold is satisfied***, the second convergence threshold being less than the first convergence threshold; and based at least in part on the estimated statistical model parameters identified at the second convergence threshold, ***identifying a good clustering data relative to the computer readable data to facilitate clustering data, wherein the clustered data is provided***.

Independent claim 63, as amended, recites: ***[a] computer implemented system to facilitate building a statistical model for a computer readable data set, comprising: first means for building a rough statistical model to characterize a subset of the computer readable data set; means for evaluating the acceptability of the rough statistical model***

based at least in part on an expectational cost-benefit analysis to facilitate reducing cost associated with clustering data relative to the computer readable data set, the first means building another rough statistical model for a larger subset of the data set if the evaluation means determines that a prior rough statistical model is unacceptable; ***second means***, which is different from the first means, ***for building a refined statistical model from an aggregate subset of data*** that yielded the rough statistical model deemed acceptable by the evaluation means; and ***means for identifying a cluster of data within the computer readable data set based at least in part on the refined statistical model to facilitate clustering data relative to the computer readable data set, wherein the clustered data is provided***.

Independent claim 64, as amended, recites: ***[a] computer implemented system to facilitate building a statistical model for a computer readable data set, comprising: first means for estimating statistical model parameters from a subset of the computer readable data set***, the data set is statistically characterizable; ***means for evaluating the estimated statistical model parameters*** relative to a holdout data set of the data set; means for determining a data subset from the training data set by causing the first means and the means for evaluating to respectively repeat estimation and evaluation of statistical model parameters with a next successively larger subset of the training data set until an acceptable quality of the statistical model parameters is established, ***the quality of the statistical model parameters established when the expected cost of generating the next successively larger subset outweighs the expected benefit in accuracy of utilizing the next successively larger subset in order to facilitate reducing cost associated with clustering data relative to the computer readable data set***; ***second means for estimating statistical model parameters*** based at least in part on the determined data subset to provide a more accurate estimation of model parameters than the first means; means for setting parameters associated with cluster weights of a cluster of data; and ***means for determining the cluster of data contained in the computer readable data set based at least in part on the more accurate estimation of statistical model parameters to facilitate clustering data relative to the computer readable data set, wherein the clustered data is provided***.

In view of at least the foregoing, it is readily apparent that the subject claims produce a useful, concrete and tangible result and are directed to statutory subject matter in accordance with 35 U.S.C. § 101. Accordingly, withdrawal of this rejection is requested.

II. Rejection of Claims 1, 3-25, 27-30, 32-42, 44-48, 50-60 and 62-64 Under 35 U.S.C. § 112

Claims 1, 3-25, 27-30, 32-42, 44-48, 50-60 and 62-64 stand rejected under 35 U.S.C. § 112, first paragraph, on the grounds that current case law requires such a rejection if a 35 U.S.C. § 101 rejection is given. Withdrawal of this rejection is requested for at least the following reason.

In view of at least the amendments to the subject claims and the reasons provided with regard to the rejection of the subject claims under 35 U.S.C. § 101, the specification contains a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and sets forth the best mode contemplated by the inventor of carrying out his invention, in accordance with 35 U.S.C. § 112, first paragraph. Therefore, it is respectfully requested that this rejection be withdrawn.

III. Rejection of Claims 1, 19, 30, 42, and 64 Under 35 U.S.C. § 102(b)

Claims 1, 19, 30, 42, and 64 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Guha *et al.* (US 5,140,530). Withdrawal of this rejection is requested for at least the following reason. Guha *et al.* does not disclose each and every element as set forth in the subject claims.

> For a prior art reference to anticipate, 35 U.S.C. §102 requires that "***each and every element*** as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999) (*quoting Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)) (emphasis added).

Independent claim 1, as amended, recites: ***a first training method that efficiently builds a rough statistical model from a subset of the computer readable data set capable of statistical characterization; an evaluation component that evaluates the rough statistical model to determine whether the subset of the computer readable data set is an appropriate subset to be utilized to build a refined statistical model for the computer readable data set based at least in part on stopping criterion to facilitate reducing cost of clustering data relative to the computer readable data set; a second training method that builds the refined statistical model for the computer readable data set from the subset if the subset is deemed appropriate by the evaluation component, the refined statistical model provides a more accurate modeling of the subset than the rough statistical model and facilitates determining good clustering of data for a fixed number of clusters based at least in part on predefined accuracy criteria to facilitate clustering of data relative to the computer readable data set, wherein the clustered data is provided***; and a data scheduler that, based at least in part on a data policy, adaptively controls the size of subsets for which the first training method is applied to facilitate building the refined statistical model. Guha *et al.* fails to disclose the distinctive aspects of the claimed subject matter.

Rather, Guha *et al.* relates to genetic learning techniques to evolve neural network architectures for applications where a general representation of neural network architecture is linked with a genetic learning strategy creating an environment for the construction of custom neural networks. (*See* Abstract.) Guha *et al.* discloses cyclically updating a population of bit string designs for different neural networks by a genetic algorithm based on their fitness. (*See* col. 2, lns. 62-65.) Guha *et al.* also discloses that fitness of a network is a combined measure of its worth on the problem, which make take into account learning speed, accuracy, and cost factors such as size and complexity of the networks. (*See* col. 2, ln. 65 – col. 3, ln. 2.)

However, unlike the claimed subject matter, Guha *et al.* is silent with respect to construction, from a data set, of a statistical model and refining the statistical model and utilizing the refined model to cluster the data set. Also, Guha *et al.* fails to disclose regarding utilizing a first training method to quickly and efficiently developing a rough statistical model associated with a data set, which can then be utilized to facilitate

building a refined statistical model (*e.g.,* more accurate statistical model) based in part on a second training method. Furthermore, Guha *et al.* is silent regarding clustering data utilizing the refined statistical model.

In contrast, the claimed subject matter can facilitate characterizing and/or clustering a set of data (*e.g.,* computer readable data set). The claimed subject matter can employ a first training method or protocol to facilitate developing a rough statistical model, which can be associated with a suitable set of training data, in an efficient manner. The claimed subject matter can evaluate the rough statistical model to determine whether the rough statistical model meets predefined stopping criterion. For instance, the claimed subject matter can perform one or more iterations to build the rough statistical model, where for each additional iteration (if any), additional data can be added to the subset of training data to facilitate building an acceptable rough statistical model. The claimed subject matter can also employ a second training method or protocol that can facilitate building a refined statistical model that can be more accurate than the rough statistical model. The refined statistical model can be utilized to facilitate characterizing and/or clustering data relative to the set of data, where the characterizing and/or clustering the data can yield desirable (*e.g.,* good) clusters due in part to the predefined accuracy criteria employed when building the refined statistical model. Further, the claimed subject matter can characterize and/or cluster data in a time-efficient and computationally-efficient manner, as compared to conventional systems or methods..

Also, independent claim 19, as amended, recites: ***a first parameter estimation protocol that efficiently builds a rough statistical model from a subset of a computer readable data set*** based at least in part on a training policy associated therewith, the computer readable data set is statistically characterizable; ***an evaluation component that determines whether the subset of data from which the rough statistical model was built is an acceptable size for building the statistical model to characterize the data set, the evaluation component utilizes a stopping criterion that is functionally related to an expected incremental benefit and an expected incremental cost associated with increasing the size of the subset of data to facilitate determining whether the rough statistical model is an acceptable size and to facilitate reducing cost of clustering data relative to the computer readable data set; and a second parameter estimation protocol***

that builds a refined statistical model for the data set from the subset if determined to have the acceptable size, ***the second parameter estimation protocol having an associated training policy, which enables the second parameter estimation protocol to build the refined statistical model to be a more accurate statistical model than the first parameter estimation protocol, the refined statistical model employed to identify clusters of data within the computer readable data set to facilitate clustering data relative to the computer readable data set, wherein the clustered data is provided***.

For at least the reasons stated herein with regard to independent claim 1, Guha *et al.* fails to disclose the distinctive aspects of the claimed subject matter as recited in independent claim 19. In addition, unlike the claimed subject matter, Guha *et al.* is silent regarding employing a stopping criterion that is based on an expected incremental benefit and an expected incremental cost associated with increasing the size of the data subset to facilitate determining whether a rough statistical model is an acceptable size.

Independent claim 30 (and similarly independent claims 42 and 64), as amended, recites: ***employing a first training method to build a rough statistical model to characterize the subset; evaluating the rough statistical model for acceptability***; if the rough statistical model is unacceptable, repeatedly increasing the size of the subset of data to provide an aggregate data set, building another rough statistical model to characterize the aggregate subset, and reevaluating the other rough statistical model, the acceptability of each rough statistical model based at least in part on a stopping criterion functionally related to an expected incremental benefit and an expected incremental cost associated with increasing the size of the aggregate subset in order to facilitate reducing cost associated with clustering data relative to the computer readable data set; and if the rough statistical model is acceptable, ***employing a second training method to build a refined statistical model based at least in part on the aggregate data set, the second training method being different from the first training method, the refined statistical model identifies data clusters contained in the computer readable data set to facilitate clustering of data relative to the computer readable data set, wherein the clustered data is provided***. For at least the reasons stated herein with regard to independent claims 1 and 19, Guha *et al.* fails to disclose the distinctive aspects of the claimed subject matter.

Furthermore, independent claim 64, as amended, in part, additionally recites:

means for setting parameters associated with cluster weights of a cluster of data. Guha *et al.* fails to disclose the distinctive feature of the claimed subject matter.

Instead, Guha *et al.* discloses applying training-input to the input of the network, modifying network weights if a desired output is not achieved. (*See* col. 3, lns. 29-33.) Guha *et al.* fails to disclose clustering data let alone setting parameters associated with cluster weights of a cluster of data.

Moreover, the Examiner does not contend that Guha *et al.* discloses the claimed subject matter as recited in claims 3-18, 20-25, 27-29, 32-41, 44-48, 50-60, 62, and 63. Guha *et al.* fails to disclose the claimed subject matter as recited in claims 3-18, 20-25, 27-29, 32-41, 44-48, 50-60, 62, and 63. Rather, Guha *et al.* relates to genetic learning techniques to evolve neural network architectures for applications where a general representation of neural network architecture is linked with a genetic learning strategy creating an environment for the construction of custom neural networks. (*See* Abstract.)

In view of at least the foregoing, Guha *et al.* fails to disclose each and every element of the claimed subject matter as recited in independent claims 1, 19, 30, 42, and 64 (as well as independent claims 44, 53, 54, 62, and 63, and dependent claims 3-18, 20-25, 27-29, 32-41, 45-48, 50-52, and 55-60). Therefore, the subject claims are in condition for allowance and the rejection should be withdrawn.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP184US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

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